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ABSTRACT

Intended to provide educators with enough information about the educational uses of computers so that they can make responsible decisions about the usefulness of computers in their own instruction, this paper defines and describes a variety of computer uses and gives advice on the selection of appropriate computer equipment and software. The first section of the paper defines computer assisted instruction (CAI), explaining some of its varieties: drill and practice, tutorial, modeling, and simulation. Other educational uses of computers are also explained in this section. The second section of the paper goes into more detail about CAI, explaining its advantages and disadvantages. This section also gives advice on integrating a computer program into an existing course. Selection of a computer system and the software to go with it are the topics of the third and fourth sections. The appendix contains sample material from an existing CAI program for study skills and the names and addresses of software sources and computing magazines. (JL)

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THE USE OF COMPUTERS IN THE CLASSROOM

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I. Educational Uses of Computers

With the advent of microcomputers, which are small, easy to use and inexpensive, computers are beginning to play a larger role in education. In fact, more and more students have easy access to a computer at home and/or at school. With this environment, it is important that all educators become well enough informed about the educational uses of computers to be able to responsibly decide whether computers can or should be utilized in their instruction.

Computers can aid instruction in many ways. The primary classifications for educational computer usage are: Computer-Assisted Instruction, Modeling and Simulation, Computer-Managed Instruction, Information Storage and Retrieval, Statistical Analysis, and Educational Games. These classifications are described in detail below.

Computer Assisted Instruction

Computer-Assisted Instruction (CAI) is generally considered an instructional system with direct interaction between the student and the computer. CAI has several forms: Drill and Practice, Tutorials, and Simulations which will be discussed in the next section.

Drill and Practice lessons provide practice in a particular skill after the skill has been introduced by, for example, the classroom teacher. Computers are well-suited to a "Drillmaster" task; they are infinitely patient and provide instant feedback. For instructors in Developmental Education, students who need more practice in a skill such as math or spelling may benefit from Drill and Practice lessons.

Tutorials, on the other hand, teach a particular skill or concept and also test for comprehension. Tutorials are generally more complex, with "remedial" sections for students having problems, and "advanced"

sections for students who are doing well. At St. Cloud State University, a CAI tutorial called CASSI (Computer Assisted Study Skills Instruction) which was discussed by Sampson (1981) has been used successfully in the Reading and Study Skills courses. CASSI was purchased from the Georgia Institute of Technology, and modified slightly for use at St. Cloud State University. Its use will be described in more detail in later sections.

Modeling and Simulation

Another educational use of computers is the modeling of a specific device or the simulation of an event in the real world. Since the world is a very complex place, the model or simulation can only approximate the real world. However, a simulation can compress years into minutes, save money (as real world experiments can be expensive), help students to visualize situations they could not otherwise experience, and allow students to test various hypotheses without harming anyone. Simulations can be used to teach problem solving, for example, presenting students with the current energy situation, providing a series of energy-related decisions for the next 10 years, and then projecting what the resultant energy situation would be. Expensive or dangerous scientific experiments may also be simulated using a computer.

Computer-Managed Instruction

Computers may not only be used to help teach students, but also to ease some of an instructor's administrative duties. Computer-Managed Instruction, as it is called, includes such tasks as: (1) keeping track of student grades, and calculating basic statistics on those grades (such as the mean, ranks of students, etc.), (2) scoring tests, and, (3) generating tests from a large set of available questions. Using a computer for some of these tasks can free time for an instructor

to provide individual help for students who need it.

Information Storage and Retrieval

Computers have the potential for storing, and quickly retrieving, much more information than most humans could. This potential can be put to excellent use in education, for example in quickly providing answers to student questions that might otherwise involve much research and time to answer. Prime examples of the use of information storage and retrieval for developmental education are the Minnesota Career Information System (MCIS) and the Guidance Information System (GIS). These systems quickly and easily provide students with information on various careers, schools, and programs of study.

Statistical Analysis

Computers are well known for their "number-crunching" or calculation capabilities. These capabilities can be put to good use in education to help analyze data gathered for research, either by students or an instructor. Much of the research done today would be much more difficult, if not impossible, if computers were not utilized to analyze the data. Computers can perform the necessary calculations much faster and easier than they could be done by hand (even with a calculator!).

Educational Games

Almost everyone is aware that computers can provide some very exciting games. Games can be used in education, either as a motivator for reluctant learners or as a teaching tool in itself. Reluctant learners can be motivated to do more problems and, perhaps, achieve a higher score if their "reward" after a correct response is to make a move in a space game. The motivation might be to increase his/her own score, to do better than his/her peers, or to do the problems as quickly as possible. A simulation set up as a game can entice students to learn

about a situation, such as travelling to Oregon on the Oregon trail in the mid-1800's. The game may keep students' interest longer than reading might.

II. Computer-Assisted Instruction

As mentioned earlier, the various forms of Computer-Assisted Instruction comprise the largest percentage of educational computer use. Like all instructional methods, CAI is not perfect, and is not the best method for all instruction. Some of the advantages and disadvantages of CAI follow.

Advantages

1. The CAI lesson may be run outside of classtime. Therefore, it would "free" class time and the instructor could use this time for individual instruction. Or, the instructor could use this time to discuss new concepts.
2. Students can proceed at their own pace. Some students will elect to spend more time on a subject, and other students less time. Neither group will cause confusion or frustration for the opposite group.
3. CAI provides immediate feedback to student responses. This allows students to monitor their own progress, and prevents the reinforcement of errors.
4. CAI can provide an alternate instructional format, thus providing variety in the course presentation and reinforcement.
5. Practice in particular skills can be personalized. Some students may proceed through a section which covers each step in a process individually, while other students may take a section which covers the process in blocks. Students select the com-

puter lessons which are developed for their particular needs.

6. Teachers may monitor student progress. In a monitoring system, a teacher may be able to quickly spot students having difficulty and provide individual assistance.

Disadvantages

1. Currently, there is a lack of quality software (CAI lessons). It is not only difficult to find software which covers the desired material, but it is also difficult to determine its quality before it is purchased. The development of software takes a large investment of time, and may involve learning a new skill, programming.
2. Many people have a fear of computers. Both students and teachers may be afraid of the "mysterious and all-powerful" computer, creating obstacles which must be overcome before the computer can be effective as an educational tool.
3. Everyone must learn to operate the equipment. Using a computer involves learning how to use the equipment, and rudimentary typing skills can greatly ease student frustration.
4. Equipment failures can occur. Due to many, varied circumstances, the computer equipment may not be available when it is needed.
5. Lessons within computer programs can be boring to students.
6. Depending on the alternatives, CAI can be more expensive than other instructional methods. The initial cost of CAI can be very expensive. Therefore, it may be more realistic to consider cost over long-range rather than short-range plans.

Experience with the CASSI tutorials at St. Cloud State University has substantiated many of these advantages and disadvantages of CAI. In the next section specific ideas for overcoming some of the disadvantages are discussed.

Integrating A Computer Program Into A Course

After deciding that a computer program meets the objectives of a specific course, plans must be developed for integrating the computer program into the course content. In the process of completing plans, many questions must be answered. Only the following three questions will be considered in this section. Where within the course structure should the computer program be placed? What written and/or oral instruction will students need to run the program? What type of on-going evaluation should be planned?

Computer Program Placement

Usually a course is divided into modules (units) of instruction. For example, the Reading and Study Skills course at St. Cloud State University is composed of five modules which interact and build on each other: time management, study strategies, notetaking, test taking, and independent study. The purpose of the independent study module is to allow each student time to work in an area the student feels needs strengthening. Students may elect to work on vocabulary, comprehension, notetaking, spelling, or test taking skills.

The CASSI program was incorporated into the independent study module because the lessons within CASSI reinforce instruction taught in the other modules. The twelve lessons within the CASSI program are as follows:

1. Introduction to Study Skills
2. Motivation and Achievement
3. Time Management
4. Reading Textbooks
5. Effective Note Taking
6. Concentration
7. Improving Your Memory
8. Procrastination
9. Studying for Exams
10. Taking Examinations
11. Reducing Test Anxiety
12. Writing Papers

Specific instruction on writing papers is not included in the Reading and Study Skills course because all students must take two composition courses. Therefore, the Writing Papers lesson reinforces instruction received in the composition courses. Students have found the Writing Papers lesson interesting and helpful.

In addition to using the CASSI lessons with students enrolled in the Reading and Study Skills course, CASSI lessons are used as one follow-up source when discussing questions with walk-in students. These students usually have questions/concerns relating to specific courses. The questions generally fall into the categories of studying for tests, taking tests, and notetaking. Students are given the written instructions and, if needed, are instructed in how to operate a terminal. Since a consultant is available in the Computer Center, students are directed to discuss particular problems that may arise when running the programs with the consultant. After completing the selected CASSI lessons, the student is asked to return the instruction sheet to the Reading Center and discuss any further questions.

Instructions for Running the Computer Program

The optimal situation would be that written instructions would be sufficient for informing students how to run a computer program. However, written instructions are not sufficient because many students have never

operated a computer terminal and, in fact, many students have never seen a terminal. Therefore, a process for introducing the computer program must be developed.

The introductory program for the CASSI lessons at SCSU has continued to evolve over many quarters. The introductory program is as follows:

1. Students receive written instructions (see Appendix). Since there are two separate computer programs used in the Reading and Study Skills course, the written instructions are color coded. That is, one set of instructions is white and the other set is yellow.

2. The written instructions are discussed in class.

3. The Computer Center developed a 15 minute videotape explaining how to operate a terminal. The videotape is scheduled to run several times a day over the first week of the quarter. Students must make an appointment for the time they will view the videotape. Afterwards, if students decide to run CASSI lessons and have difficulties, they can receive help from the Computer Center consultant.

4. For the first two weeks of each quarter the Reading Center checks out a terminal from the Computer Center. The Reading staff, consisting of instructors and student workers, help students on an individual basis in running the programs. This personal attention has alleviated many fears. After helping a student once, the student is usually prepared to operate a terminal in the Computer Center.

5. An evaluation plan was developed. This plan will be discussed in the following section.

Evaluating Computer Programs

It is helpful if more than one person can be involved in evaluating computer programs. At SCSU, the Evaluation Committee consisted of two counselors from the Counseling Center and two instructors from the Reading Center. These people read the CASSI lessons and suggested changes.

When evaluating computer programs, it should be anticipated that computer programs developed for a specific purpose at another college or university may need some adjustment to fit the purpose for which it was

purchased. Although the Evaluation Committee suggested several changes in the CASSI lessons, only two of the changes will be discussed. One, in the original programs students were directed to make an appointment at the Counseling Center if the student had questions and wanted additional assistance. At SCSU many of these questions would be answered by the Reading Center personnel. Therefore, the CASSI lessons were reviewed and "Counseling" Center was changed to "Reading" Center in selected areas of the text. Two, at the end of the original CASSI lessons, students received a list of books they would find useful if they wanted additional information. This listing was deleted because one of the books was used as the text for the class and some of the other suggested texts were not available at SCSU. Therefore, if needed, course instructors used other sources for follow-up in place of the deleted list of books.

After all the suggested changes were made by the Computer Center support person, the lessons were introduced to students enrolled in the Reading and Study Skills course. The students were asked to read not only for content, but also for format. That is, if students noted a typing error such as "column" typed as "columm" or a grammar error such as a missing comma, they were asked to mark the error and tell their instructor. Some students even suggested format changes which would improve the lessons. All changes suggested by the students were evaluated by a Reading Center instructor and the Computer Center support person. Then, the Computer Center support person made the changes. This procedure has been repeated each quarter.

Changes continue to be made based upon student suggestions and questions. The most recent change was made in the written instructions. Since students ask many questions about the CASSI lessons, the written

explanation of the CASSI lessons was included with the written instructions for running the CASSI program.

III. Selection of a Computer System

If a school does not already own or have access to a computer system, and instructors wish to use a computer in their courses, some form of computer system must be purchased. This section will one, describe the available sizes of computers, two, discuss how to decide what size is needed, and three, give a brief description of some popular microcomputers.

Available Sizes

There are three general sizes of computers: maxicomputers (or mainframes), minicomputers, and microcomputers. As their names imply, their capabilities, size, and cost range from very large to very small.

Maxicomputers

Maxicomputers, or mainframes, are the largest computers. Maxis perform calculations very quickly, handle very large applications, and in addition, many people can use the system at the same time (up to 400 people or more). A moderate to large staff is needed to operate and maintain the system and its programs. Maxis are expensive, ranging in cost from $250,000 to $10 million. Unless many schools are sharing a computer system, a mainframe is probably more powerful than most schools need.

The Minnesota Timeshare System, serving most schools in the state, is a maxicomputer, a mainframe. Up to 420 people can access this system at the same time. Because of recent changes in funding to MECC for communication costs and the state of the economy in Minnesota, many schools have opted to stop using MTS. Up to 420 people can access the system, but this change has reduced the number who will.

Minicomputers are medium sized computer systems. Minis perform calculations fairly quickly, can handle medium to large applications,

and up to 64 people can use the system at the same time. A small to moderate staff is needed to operate and maintain the system and its programs. Minis are moderately expensive, with costs ranging from $10,000 to $250,000. A moderate to large school could probably do all of its computer processing on a minicomputer.

Microcomputers

Microcomputers, also called personal computers, are the smallest computer systems. Micros perform calculations slower than minis or maxis but still fast compared to humans. Micros have other features unavailable, or expensive, on minis or maxis: color, graphics, sound, etc. Only one person can use a micro at one time, hence the name "personal". Elementary students can easily learn to operate one, and most stores which sell micros will service them. Micros are relatively inexpensive, ranging from $150 to $10,000 with most costing between $1,000 and $2,000. Micros can't handle large applications; however, most CAI and other educational applications can be well suited to micros.

Microcomputers are becoming very popular in education and in homes. The cost has put educational computing within the reach of most schools, and their potential is vast.

Evaluation of Needs

There are several important factors to consider when deciding which size of computer system to purchase. These factors are listed below.

Minicomputers

1. Available Systems: Is there a computer system already available? If so, will it fulfill the needs of the applications?
2. Available Money: How much money is available for a computer purchase? Can the needed system(s) be purchased with this amount?

3. Computational Power: Will a large percentage of the applications involve complicated computations, or the printing of long reports? If so, a larger computer system might be considered.
4. Special Features: Are special features such as graphics or sound needed for some of the applications? If so, a microcomputer might be considered.
5. Existing Software: Do any of the applications involve purchasing existing software? If so, the computer system purchased must be compatible with the one the existing software needs. Also, is there a selection of quality software which might be purchased in addition to the planned applications?

For most schools, the answers to these questions lead them to the purchase of microcomputers. A goal of 70% utilization per microcomputer seems to be reasonable when deciding how many should be purchased. For example, if 100 students need to use the micros for 4 hours per week, the number of microcomputers needed would be determined as follows:

100 students x 4 hours = 400 hours per week needed

If micros available 80 hours per week:

400/80 = 5 micros would be 100% utilized

400/.70 = (400 = 70% of 570)

570/80 = 7.13 micros would be 70% utilized

Thus 7 or 8 microcomputers should be purchased.

Description of Available Microcomputers

There are many brands of microcomputers available, and choosing between them can be a hard task. Some micros are more popular, and better suited, for educational applications. To aid in the selection of a microcomputer, a brief summary of the main features of some of the most popular microcomputers is discussed next.

1. Apple II: The main features of the Apple II are: color video, two levels of graphics, and sound (one voice only). The cost is between $1,000 and $3,000. A good amount of educational software is available for the Apple II. The Apple II will soon be replaced by the Apple IIE, a more powerful model (faster, 64K memory standard).

2. Radio Shack TRS-80: The main features of the TRS-80 models are graphics and color video (color is only available on one model). The cost is between $600 and $3,000. A good amount of educational software is available for the TRS-80.

3. Atari 400/800: The main features of the Atari models are six levels of graphics, sound (4 voices), and color video. The Atari 400 is a smaller, non-expandable machine with a touch keyboard. The cost for an Atari 400 is between $600 and $1,000; for the Atari 800 the cost is between $1,000 and $3,000. A fair amount of educational software is available for the Ataris.

4. Commodore Pet: The main features of the Commodore Pet are graphics and an upper/lower case keyboard. The cost is between $1,000 and $4,000. A fair amount of educational software is available for the Pet. The Commodore 64 (new) has a 64K memory and is able to run Apple, Atari and TRS-80 software; the price is the same or less than the Apple II.

5. Others: Many other microcomputers are available. Texas Instruments' 99/4, and IBM's new personal computer are also being used in education. The Digital Equipment Corporation, a leading manufacturer in minicomputers, has announced a

family of four microcomputers; the range of prices is $2,500 plus.

Overall, each brand of microcomputer has its advantages and disadvantages. The primary considerations in the decision tend to be cost vs. features needed, with the amount of available software also playing a role.

IV. Selection of Software

One of the most difficult tasks an educator can face in utilizing a computer in his/her instruction is locating quality software. Software can be difficult to locate especially for those in higher education, and it is also difficult to determine the quality of software before it is purchased. However, all is not lost. As computers become more popular in education, more software becomes available. Using some of the techniques listed below, it may be possible to eliminate some poor software before it is purchased.

Selection of Software Without Viewing

Many institutions are facing budget cuts, therefore, it is especially important for all purchases to be made wisely, including the purchase of educational software. One should thoroughly investigate the quality and content of software before purchasing it. Some suggestions are given below to help in the elimination of poor software. These suggestions are guidelines and may be expanded.

1. Read the advertisement or catalog description carefully. Be sure that the software can be purchased in a version which will work on your computer system. Clarify, as much as possible, that the software is aimed at the appropriate grade level. If you are still interested in the software,

further investigation is warranted. If the price in inexpensive (and this amount depends on the budget available), you may wish to purchase the software.

2. Explore any and all sources of available information for a review or further information on the software. This exploration can include searching relevant magazines and journals for computer reviews, asking colleagues if they have heard of the software and what their opinion is, asking the staff at the local computer store for their opinions, and asking your school's computer staff for their opinion. Again, review the information found and determine if the software should be purchased, subjected to further checks, or discarded.
3. Write the publisher or vendor of the software for more complete information. You may wish to ask for a demonstration disk to help you evaluate the software. Some demonstration disks contain portions of the programs. Try to obtain a more complete description of the software to determine how it handles student responses, the type of feedback given, the number of segments and their length, and the type of help given to students having problems. It might also be helpful to find out who designed the software, for example, an instructor, programmer, or a student.

Once all avenues have been explored, the final purchase decision must be made. The more information known about the software, the easier the decision making process.

Evaluation Criteria

It is much easier to evaluate the quality of software if one has

the opportunity to review it, or a portion of it. Each piece of software is unique; however, there are some common features to aid in their evaluation. Some of the features, and what to look for, are discussed next.

1. Quality of Material
   - Is it accurate?
   - Is it at an appropriate reading level?
2. Suitability of Application for a Computer
   - Would the objectives be better met by another instructional method?
3. Presented in a Logical Order
4. Equipment Requirements
   - Is the needed equipment available?
   - If not, how much does it cost? Can it be purchased?
5. Error Handling
   - Does it provide understandable responses to student errors?
   - Will it accept an answer even if extra words are given, or if the punctuation is not correct?
   - Will it allow a student to try again after an incorrect response?
   - Does it provide the answer after a reasonable number of student tries?
6. Motivation/Reinforcement
   - Is the motivation sufficient for the students who will be running it?
   - Is the motivation and reinforcement suitable?
   - Does it provide a variety of reinforcement responses?

7. Appearance of Text
   - Is it readable?
   - Is it double spaced?
   - Is it arranged in small paragraphs?
   - Does it overuse flashing or inverse modes?
   - Does the text jump around on the screen?
8. Adequate Time to Read each Screen
9. Understandable Instructions
   - Are instructions easy to understand while running program?
   - Is external support material (documentation) provided for the student teacher? If so, is it useful?

The review of software is a fairly subjective process, but keeping evaluation questions in mind can help make the process a little more objective. The final decision of whether or not the software is suitable for the purposes intended is, of course, up to the individual.

When the CASSI software was received at St. Cloud State, a review procedure was initiated. Overall, the software was very good, however, minor changes were needed to make it suitable for SCSU students.

Software Sources

Non-computer professionals can be baffled when it comes to the questions of where to look for software relating to their field. However, software is becoming more plentiful as education begins to use computers more and more. There are several different types of sources for software. The major categories are listed below.

1. Software Clearinghouses: A software clearinghouse sells software written by others, possible modifying it so that it

meets their standards. Two clearinghouses which have an excellent reputation for quality software are: CONDUIT (out of the University of Iowa), and the Minnesota Educational Computing Consortium (MECC). CONDUIT specializes in software for higher education for both large computer systems and microcomputers. MECC sells software for all levels of education, for Apple II and Atari microcomputers. CONDUIT and MECC also sell excellent support materials for the student and the teacher which complement the software. (See Appendix).

2. Software Vendors: The popularity of microcomputers in both the home and schools has created more and more software vendors. Most have some sort of catalog which describes their software. To locate the names of software vendors, one can check at a local computer store, or look for advertisements in computing magazines. Many hardware venders also sell some software. Book publishers are also beginning to get into the business of selling software. The quality of software from these sources in unknown, and one should follow the techniques given in the earlier section on selecting software without viewing before purchasing software from these sources.

3. Magazines/Journals: Many computing magazines are now being published, and some emphasize educational computing. These magazines often contain reviews of software, which can help determine the quality of that software. In addition, some of these magazines contain actual listings of software which may then be entered into your computer. Many trade-related journals also contain articles on computer software which has been developed

across the country. These articles are valuable for finding software which someone else has developed to fit the same type of needs.

4. Conferences/Colleagues: In recent years, the percentage of presentations at professional conferences which discuss computer-related applications has increased steadily. These presentations can be an excellent source of relevant software. Discussion with colleagues from across the country can also lead to new sources of software.

Every source of software which can be searched for relevant software can be beneficial. Remember that computer center personnel can also aid in the search for software.

The CASSI software was first located in an article in a professional journal. After writing for further information, the package was purchased. This purchase indicates that the best software is often written by fellow educators.

Development of Software

If suitable existing software can't be found, you may decide to develop your own software. As with the design of any instruction, this can be a very time consuming task.

The obvious first step in the development of software is the generation of the idea. It can be helpful to discuss ideas with colleagues to get their opinions of it. Always try to make sure that every idea is a suitable application for a computer.

If it has not been done, the next step is to search for existing software which might be usable. The search process was described earlier. Keep in mind that it could be easier to make some modifications to existing software rather than starting from scratch and designing a

program.

If a decision has been made to design software, choose the computer system to be used. This computer system may be the only one available or it may be possible to purchase one. After the system is selected, decide in what language to write the software. This decision can be affected by several factors including previous knowledge, technical help available, cost and type of application. The best advice is to ask your computer center personnel to assist you in this decision.

Next, the objectives of the software must be developed. The general outline and purpose of each section are needed before beginning the detailed writing. This is necessary to help keep the writer on the original track. This may include the writing of a final test for each section to verify that students have learned the information.

The logical next step is to begin writing the actual software. A teacher does not have to be a computer programmer to write software. A common and very workable solution is to have the instructor design the software (what should each section do), and have a programmer actually code the software into the computer. The programmer may be one of your computer center's personnel, or a student interested in programming.

Once the software is written, it must be evaluated to see if it meets the original objectives, and to see if it meets the evaluation criteria mentioned earlier. Of course, it must also be tested to make sure that it does not contain any errors. It is usually a good idea to have a colleague evaluate the software, to get another expert's opinion, and in addition, to have a small group of students evaluate the software. The students may have valuable criticisms and comments which will improve the quality of the software.

After deciding that the software is complete, it is ready for use in instruction. However, the work is not completed. As with any instruction, software must continually be reviewed and modified to fit changing needs.

V. Conclusion

There is vast potential for the use of computers in education. Microcomputers have brought the cost of computing within the reach of most schools. All disciplines and all students can utilize micorcomputers.

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Apperdix

CASSI

Computer Assisted Study Skills Instruction (CASSI) is designed to assist you in improving your study skills. Twelve different topics are included in CASSI:

1. Introduction to Study Skills
2. Motivation and Achievement
3. Time Management
4. Reading Textbooks
5. Effective Notetaking
6. Concentration
7. Improving Your Memory
8. Procrastination
9. Studying for Exams
10. Taking Examinations
11. Reducing Test Anxiety
12. Writing Papers

The reverse side lists the instructions for running CASSI. Use the terminals in the Computer Center in Brown Hall basement. The hours of operation are posted in the Computer Center. A consultant is usually on duty.

If you wish, schedule an appointment with your instructor for help with operating a terminal. It is sometimes possible for the Reading Center staff to use the terminal in the Counseling Center.

If you are in 019 Reading and Study Skills, record the time(s) it takes you to run the lesson(s) you wish to do. You do not have to do every lesson. Do not do lesson 10, Taking Examinations. Give the lessons plus the times to your instructor when you have your final conference. Or, attach the printout to your Independent Study work and give all your I.S. work to your instructor when you have completed your work.

Please use the DEC terminal so you will get a printout for CASSI.

INSTRUCTIONS FOR USING CASSI

What appears on your terminal	What you do/type
	Turn switch to "ON" Switch may be 1) on the front at the top 2) in the back 3) by your knee 4) look to see if there are any special instructions to follow.
1. ——————————→	1. Press "Return" key once
2. WHICH SYSTEM	2. Type 2 and press "Return"
3. TYPE 6 RETURNS AT GO SIGNON GO	3. Press "Return" 6 times
4. date time MECC TIMESHARE SYSTEM... USER NUMBER:	4. Type your user number and press "Return", user number: USSC114
5. PASSWORD XXXXXXXXX	5. Type your password and press "Return". Password: FELLEN
6. READY	6. Type: X,TUTOR
7. WELCOME TO MECC MULTITUTOR MULTITUTOR WHAT TYPE OF TERMINAL ARE YOU USING? >	7. Type: TELERAY if on screen terminal with separate keyboard. DEC all other terminals (printing terminal for example press "Return" (suggestion: use DEC terminal)
8. Please enter your name >	8. Type your name and press "Return"
9. What is the name of your group? (press "Return" if none)	9. Press "Return"
10. Multitutor Enter the name of the lesson you want. >	10. Type: USER
11. Type the new user number	11. Type: SUSSØØ3 (note Ø means zero)
12. User number reset to ... SUSSØØ3 Multitutor Enter the name of the lesson you want.	12. Type: CASSI and press "Return"

Software Sources
(Partial List)

Software Clearinghouses

CONDUIT
P.O. Box 388
Iowa City, IA 52244
Educational software for mainframes, Apple II, and TRS-80 computers.

Minnesota Educational Computing Consortium (MECC)
Publications Department
2520 Broadway Drive
St. Paul, MN 55113
Educational software for Apple II and Atari microcomputers.

Software Vendors

Audiosetts Service Corp.
930 Pitmer
Evanston, IL 60202
Educational and recreational software for most major microcomputer brands.

Automated Simulations
P.O. Box 4232
Mountain View, CA 94040
Simulation software for most major microcomputer brands.

Avant-Garde Creations
P.O. Box 30160
Eugene, OR 97403
Educational and recreational software for most major microcomputer brands.

Com Press Inc.
P.O. Box 102
Wentworth, NH 03283
Educational software for most major microcomputer brands.

Dymacomp Inc.
6 Rippingale Road
Pittsford, NY 14534
Educational and recreational software for most major microcomputer brands.

Eduware Services, Inc.
22035 Burbank Blvd, #223
Woodland Hills, CA 91367
Educational Software for most major microcomputer brands.

Entelek
P.O. Box 1303
Wardwhidden House/The Hill
Portsmouth, NH 03801
Educational and recreational software for most major microcomputer brands.

Hobbyworld Electronics
19511 Business Center Drive
Northridge, CA 91324
Educational and recreational software for most major microcomputer brands.

Microdynamics Educational Systems Inc.
2360 SW 170th Street
Beaverton, OR 97005
Educational and recreational software for most major microcomputer brands.

Opportunities for Learning, Inc.
8950 Lurline Ave., Dept. A740
Chatsworth, CA 91311
Educational software for most major microcomputer brands.

Programma Int. Inc.
3400 Wilshire Blvd.
Los Angeles, CA 90010
Educational and recreational software for most major microcomputer brands.

Rainbow Computing
9719 Reseda Blvd.
Northridge, CA 91324
Educational and recreational software for most microcomputer brands.

Recreational Computers Plus
11814 Coursey Blvd, Suite 215
Baton Rouge, LA 70816
Educational and recreational software for most major microcomputer brands.

The Software Factory
515 Park Street
Anoka, MN 55303
Educational software for most major microcomputer brands.

Versa Computing Inc.
3541 Old Conejo Road, Suite 104
Newbury Park, CA 91320
Educational software for the Apple II microcomputer.

Weldon Electronics
11319 Highway 7
Hopkins, MN 55343
Educational and recreational software for Apple II, TRS-80, Atari 400/800, Commodore Pet and TI 99/4 microcomputers. Also sells hardware.

Over

Book Publishers Which Sell Software

Hayden Book Company
50 Essex Street
Rochell Park, NJ 07662

Milliken Publishing Company
1100 Research Blvd.
St. Louis, MO 63132

Scott Forsman
Electronic Pub.
1900 E. Lake Ave
Glenview, IL 60025

McGraw Hill
Technology Marketing Manager
School Division
1221 Avenue of the America's
New York, NY 10020

Random House
School Division
2970 Brandywine Road
Atlanta, GA 30341

Computing Magazines

Classroom Computer News
P.O. Box 266
Cambridge, MA 02138
Educational computing magazine, containing articles and software reviews. Cost: $12/year (6 issues).

Creative Computing
P.O. Box 789-M
Morristown, NJ 07960
General computing magazine for all levels of expertise. Also sell educational software for most major microcomputer brands. Cost: $19.97/year (12 issues).

Popular Computing
P.O. Box 307
Martinsville, NJ 08836
General computing magazine, emphasizing microcomputers. Cost: $15/year (12 issues).

Softalk
11021 Magnolia Blvd.
North Hollywood, CA 91601
General computing magazine, featuring software reviews. Cost: $24/year (12 issues).

The Computing Teacher
Dept. of Computer & Information Science
University of Oregon
Eugene, OR 97403
Emphasizes the instructional use of computers. Cost: $14.50/year (9 issues).

T.H.E. Journal
P.O. Box 992
Acton, MA 01720
Emphasizes the instructional use of computers and audio-visual technology. Cost: Free for educators (6 issues/year).

Personal Computing
P.O. Box 1408
Riverton, NJ 08077
General computing magazine, emphasizing microcomputers. Cost: $14/year (12 issues).